BEST AVAILABLE IMAGES

Defective images within this document are accurate representations of the original documents submitted by the applicant.

Defects in the images may include (but are not limited to):

- BLACK BORDERS
- TEXT CUT OFF AT TOP, BOTTOM OR SIDES
- FADED TEXT
- ILLEGIBLE TEXT
- SKEWED/SLANTED IMAGES
- COLORED PHOTOS
- BLACK OR VERY BLACK AND WHITE DARK PHOTOS
- GRAY SCALE DOCUMENTS

IMAGES ARE BEST AVAILABLE COPY.

As rescanning documents *will not* correct images, please do not report the images to the Image Problem Mailbox.

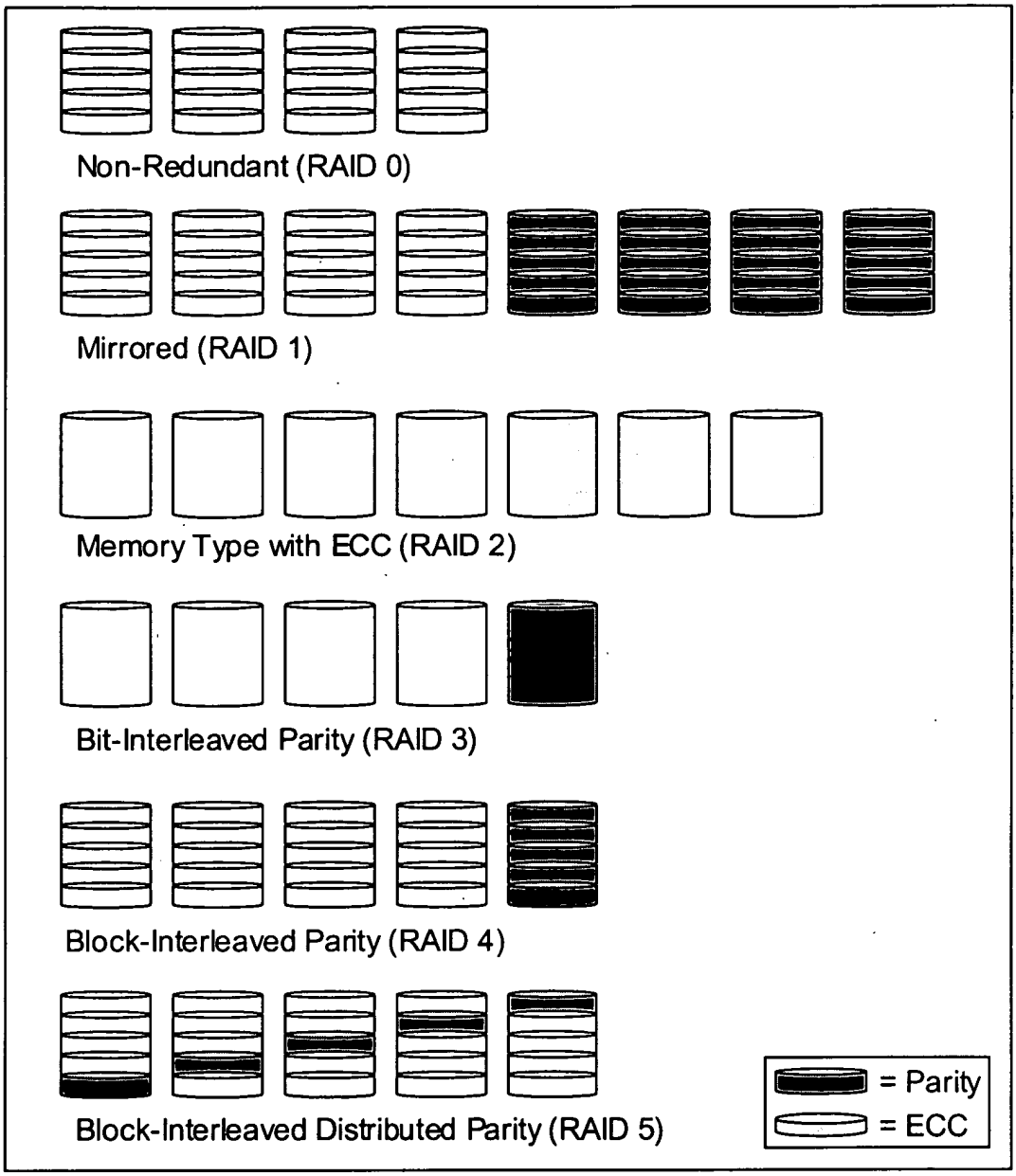
Non-Redundant (RAID 0)
Mirrored (RAID 1)
Memory Type with ECC (RAID 2)
Bit-Interleaved Parity (RAID 3)
Block-Interleaved Parity (RAID 4)
Block-Interleaved Distributed Parity (RAID 5)
= Parity
= ECC

Figure 1

RAID 0	Data is striped across drives with no data redundancy provided. Multiple disks are used to improve performance, but there is no logic present to protect/recover data. The performance gain is attained by using large blocks of data I/O and spreading the load across many disks.
RAID 1	Data redundancy is obtained by storing exact copies on mirrored pairs of drives. Two or more copies of data are written to two or more different disks at the same time. Data may be read from any disk, based on device availability. Although reliability is high, two or more times the amount of disk storage must be purchased.
RAID 2	Data is striped at the bit level; multiple error-correcting disks provide redundancy; not a commercially implemented RAID level.
RAID 3	Data is striped across all data drives, and one drive is set aside for parity information. This does well for large files where large blocks size and sequential I/O are used; not practical for small arrays.
RAID 4	Data is written in blocks, and one drive is set aside for parity information. This type is good for large block transfers; the parity drive is overworked if many small transfers are attempted-low IOPs.
RAID 5	Data is striped in blocks, and parity information is rotated among all drives in the array. This type is best for small transfers-high IOPs.
RAID 6	This level of RAID is a variation on the foundation of RAID 5 where an additional Parity Stripe is recorded which adds another level of protection for the data set. This RAID implementation has poor write performance.
RAID 7	This is a specialized RAID system that uses an embedded RTOS and specialized controller H/W. It is very expensive and proprietary.
RAID 10	Data is striped across drives and mirrored on another striped set. The advantage is that the striped sets provide higher bandwidth access to large blocks of data. This is a very expensive RAID solution
RAID 0+1	Data is striped on a RAID 0 set and also mirrored to a RAID 0 set. The resulting structure has very good performance, but is expensive. RAID 0+1 requires a minimum of 4 drives.
RAID 53	This is really a RAID (0+3). It consists of a standard RAID 3 with a RAID 0 attached in parallel. It is a way to boost the read performance of a RAID 3. Not used much.

Figure 2

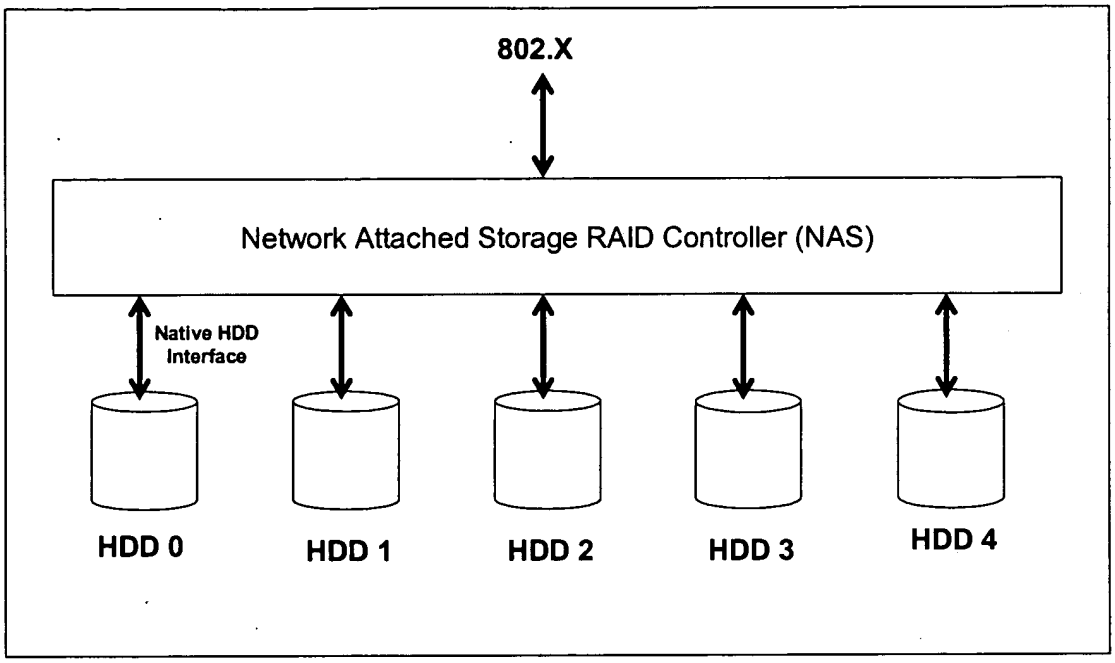

Figure 3

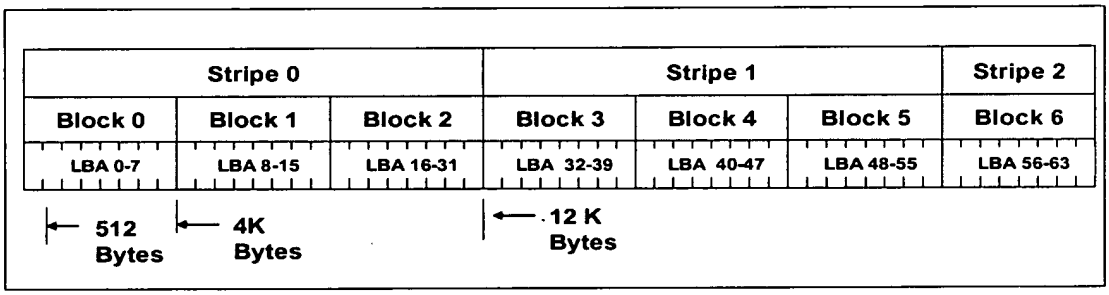

Figure 4

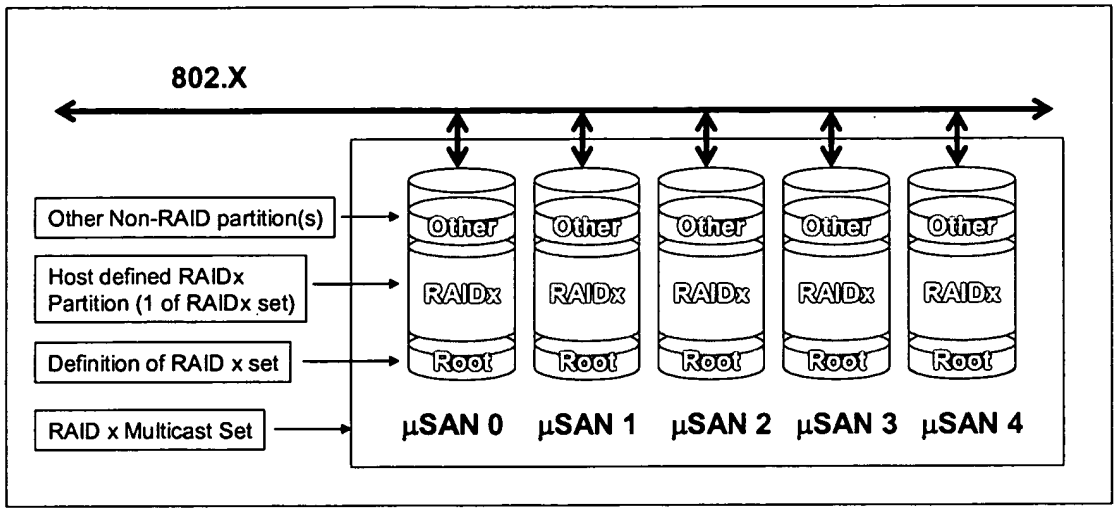

Figure 5

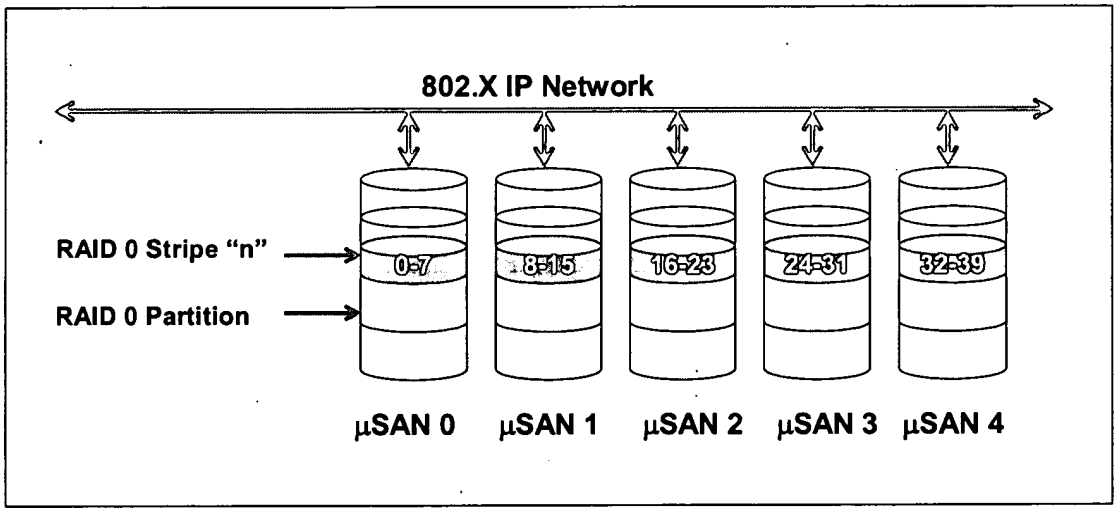

Figure 6

	Write Data Command	Read Data Command
Access Data as LBAs	Multicast: Transfer	Multicast: Request Transfer
Access Data as Block	Multicast: Transfer	Multicast: Request Transfer
Access Data as Stripe	Multicast: Transfer Stripe	Multicast: Request Transfer

Figure 7

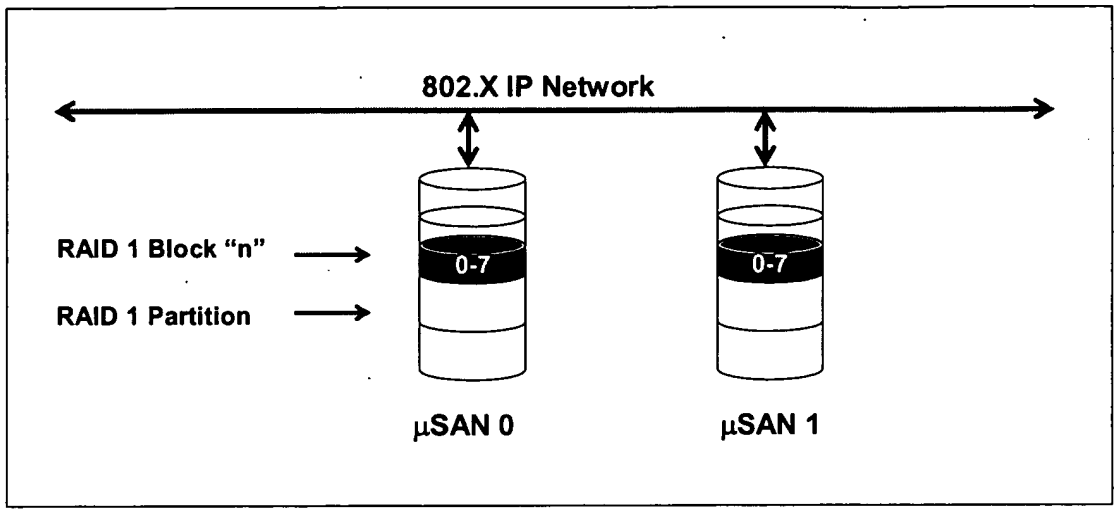

Figure 8

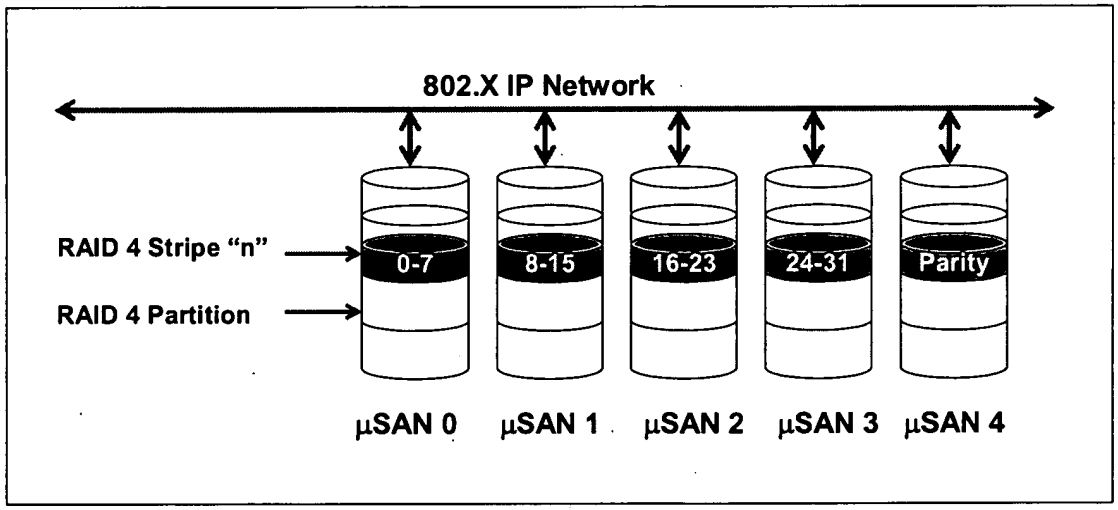

Figure 9

	Write Data Command	Read Data Command
Access Data as LBAs	Multicast: Transfer	Multicast: Request Transfer
Access Data as Block	Multicast: Transfer	Multicast: Request Transfer
Access Data as Stripe	Multicast: Transfer Stripe	Multicast: Request Transfer

Figure 10

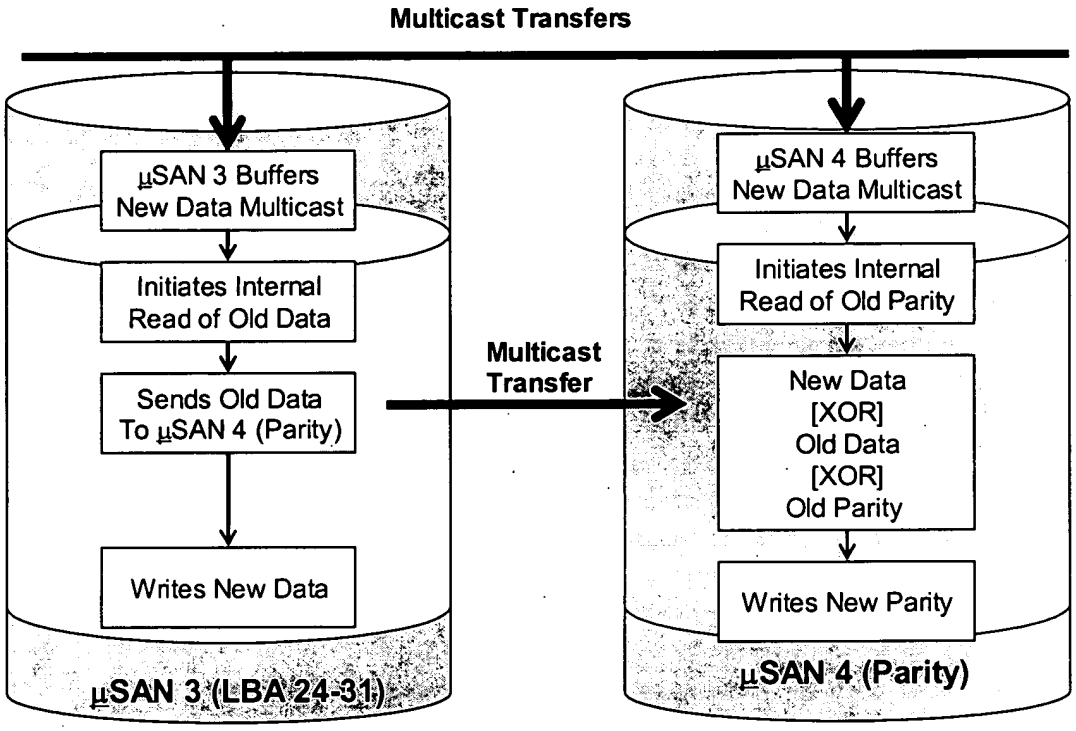

Figure 11

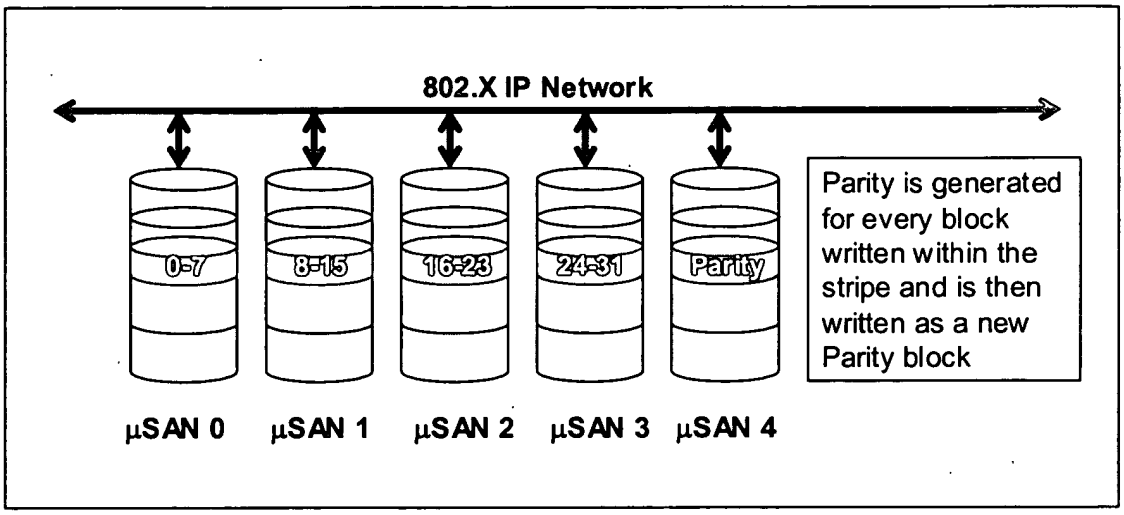

Figure 12

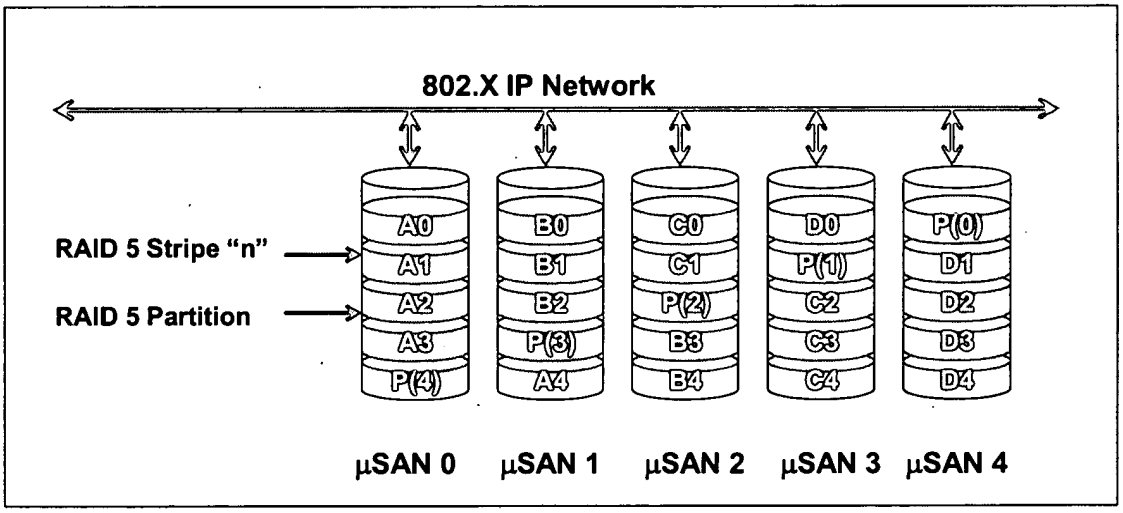

Figure 13

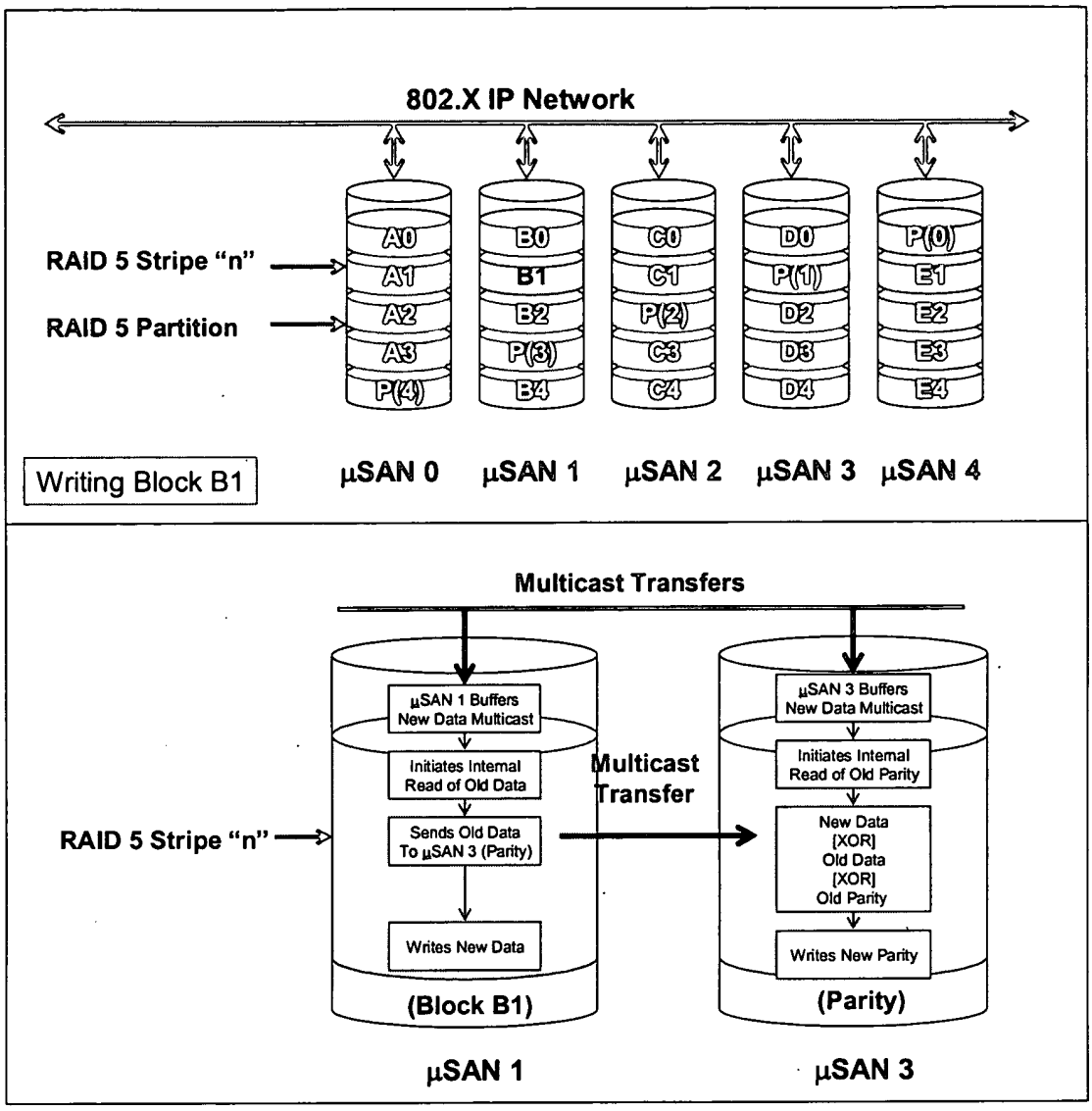
802.X IP Network
RAID 5 Stripe "n"
RAID 5 Partition
A0
A1
A2
A3
P(4)
B0
B1
B2
P(3)
B4
C0
C1
P(2)
C3
C4
D0
P(1)
D2
D3
D4
P(0)
E1
E2
E3
E4
Writing Block B1
µSAN 0
µSAN 1
µSAN 2
µSAN 3
µSAN 4
Multicast Transfers
µSAN 1 Buffers New Data Multicast
Initiates Internal Read of Old Data
Sends Old Data To µSAN 3 (Parity)
Writes New Data
(Block B1)
Multicast Transfer
µSAN 3 Buffers New Data Multicast
Initiates Internal Read of Old Parity
New Data [XOR] Old Data [XOR] Old Parity
Writes New Parity
(Parity)
RAID 5 Stripe "n"
µSAN 1
µSAN 3

Figure 14

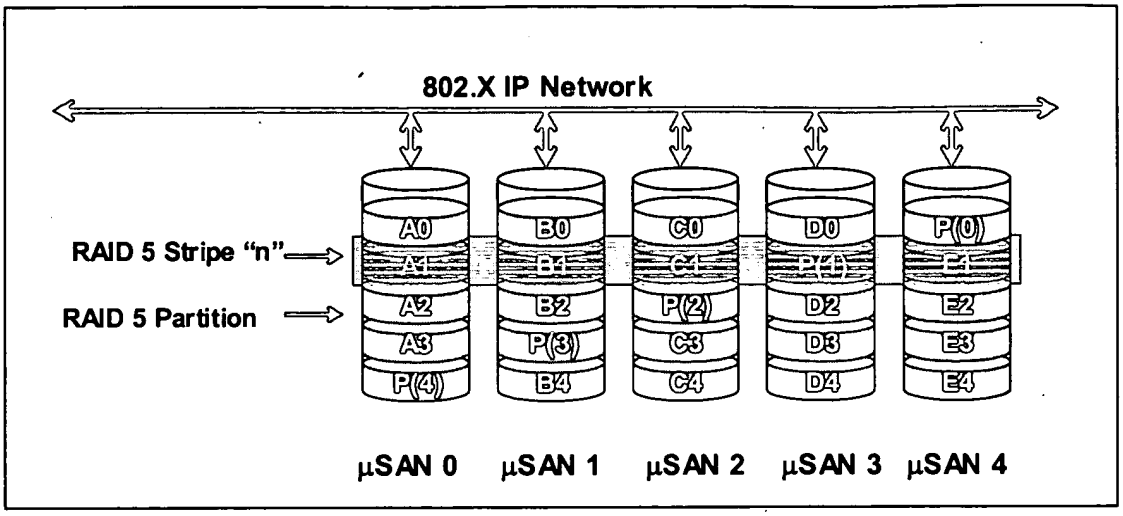
802.X IP Network
RAID 5 Stripe "n"
RAID 5 Partition
A0
A1
A2
A3
P(4)
B0
B1
B2
P(3)
B4
C0
C1
P(2)
C3
C4
D0
P(1)
D2
D3
D4
P(0)
E1
E2
E3
E4
µSAN 0
µSAN 1
µSAN 2
µSAN 3
µSAN 4

Figure 15

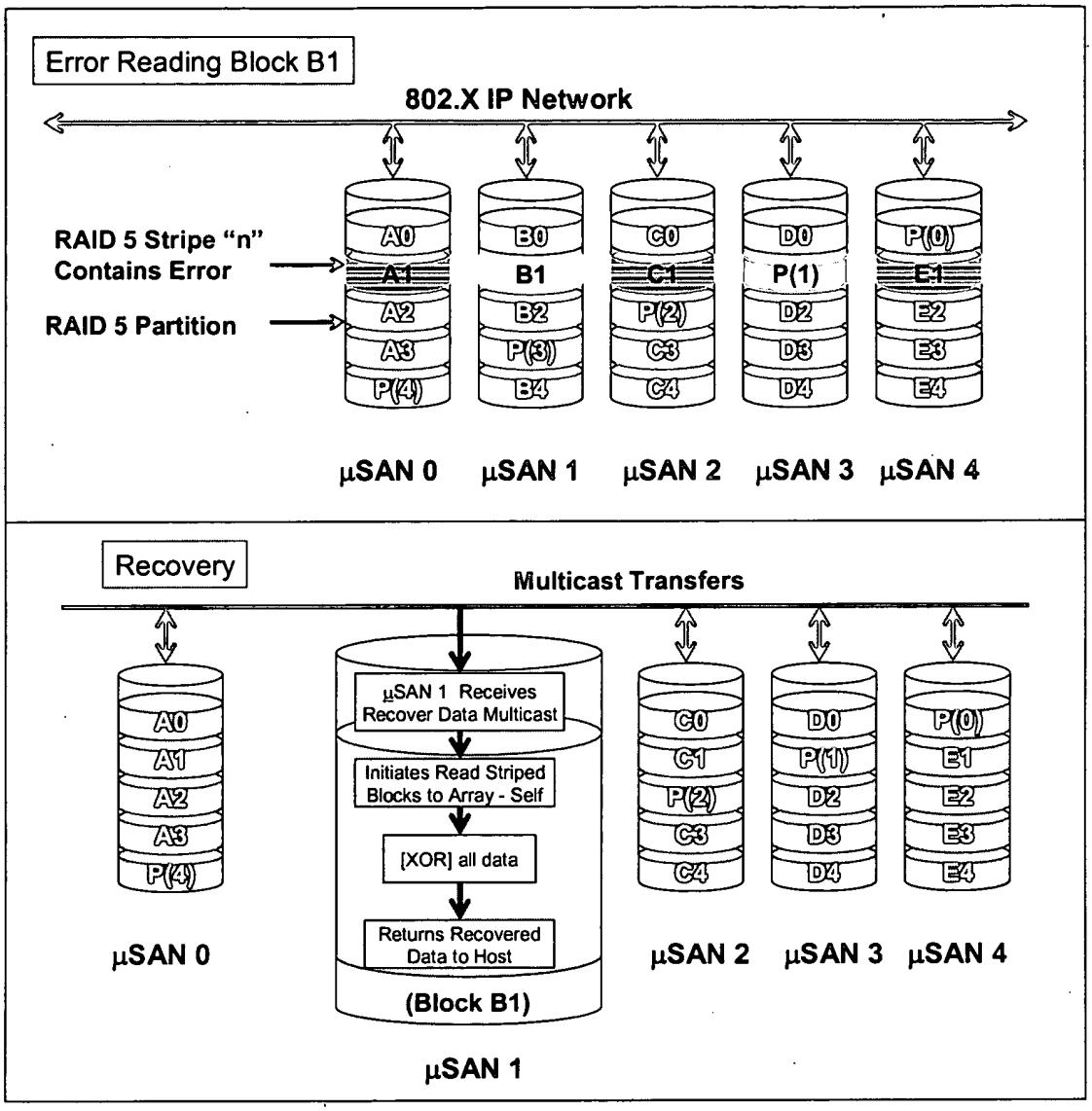
Error Reading Block B1
802.X IP Network
RAID 5 Stripe "n"
Contains Error
RAID 5 Partition
A0
A1
A2
A3
P(4)
B0
B1
B2
P(3)
B4
C0
C1
P(2)
C3
C4
D0
P(1)
D2
D3
D4
P(0)
E1
E2
E3
E4
µSAN 0
µSAN 1
µSAN 2
µSAN 3
µSAN 4
Recovery
Multicast Transfers
µSAN 1 Receives Recover Data Multicast
Initiates Read Striped Blocks to Array - Self
[XOR] all data
Returns Recovered Data to Host
(Block B1)
µSAN 0
µSAN 1
µSAN 2
µSAN 3
µSAN 4

Figure 16

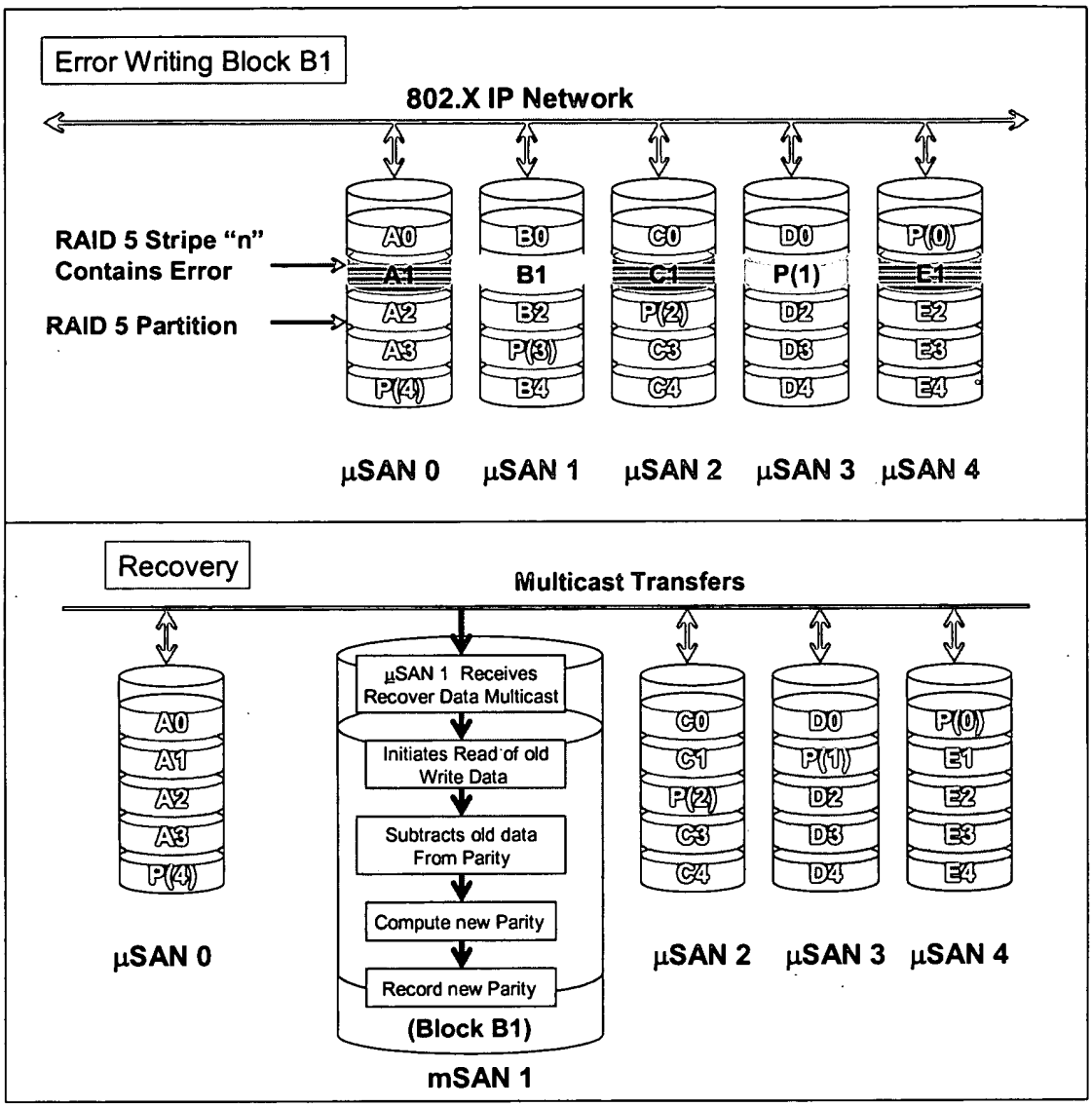

Figure 17

	Command	Token	Delimiter	LBA	Data
Size	1 byte	X bytes	1 byte	5 bytes	512* bytes
Data (hex)	21	ASCII	0	Binary	Binary

** - 530 bytes if the block size has been extended*

Figure 18

	Command	Token	Delimiter	LBA	Data
Size	1 byte	X bytes	1 byte	5 bytes	512* bytes
Data (hex)	41	ASCII	0	Binary	Binary

** - 530 bytes if the block size has been extended*

Figure 19